

REMARKS

The Office Action dated September 9, 2005 withdraws the previous rejection under 35 U.S.C. §112 ¶ 1. As the Office Action makes new rejections under 35 U.S.C. §102(e) and 103(a), the Office Action is properly non-final. No new matter is added herein.

Claims as Previously Presented are Novel in view of Quate et al.

The independent claims as previously amended provide a cantilever palette having cantilever fingers 30 and a frame with frame fingers 41. These together form diffraction grating 42. [See Paras. 0028 and 0031 of the specification]. This structure is clearly seen in Figs. 3 and 6.

In accordance with the invention: "... the movement of the cantilever 28 causes the cantilever fingers 30 to move with respect to stationary frame fingers 41, thereby producing an optically visible event." [See Para. 0038 of the specification].

The deflection of cantilever 28 with respect to stationary frame fingers 41 changes the dimensions of the spacings between the individual cantilever fingers 30 and their adjacent frame fingers 41. This movement, of cantilever fingers 30 (caused by deflection of cantilever 28) with respect to stationary frame fingers 41, changes the spacing, producing a correspondingly easy to observe visual effect, also seen in Applicants' Fig. 9 where brightened bands are formed at the 0th and 1st orders of diffraction.

The Examiner is correct that Quate et al., U.S. 6,436,647 issued Aug. 20, 2002, in claim 18 refers to light reflecting off a grating by measuring an intensity of diffracted modes of light reflected off the grating.

However, Quate explains that a first cantilever has attached analyte molecules, interleaved with a second cantilever to which the first analyte molecules are not attached. This

interleaving of first and second cantilevers is shown in Quate's Fig. 4 and a description of Fig. 4 in column 5, line 60 to column 6, line 5.

Quate describes the structure and function of the cantilevers:

...a second cantilever 190 can be used as a reference cantilever. The second cantilever 190 is preferably mounted side by side with cantilever 110. In such an embodiment, a surface of the second cantilever 190 is prepared in the same manner as the first cantilever 110 which will be used for hybridization. However the second cantilever 190 does not have a binding partner, such as single stranded DNA, attached onto one of its surfaces and is not treated with sample analyte molecules, such as DNA. [Ibid., column 5 line 60- column 6 line 2; emphasis added]

An important consequence of this arrangement, clearly shown in Quate's Fig. 4, is that the first cantilever, 110, and the second cantilever, 190, are both configured to deflect. One of ordinary skill in the art, reading Quate's Fig. 4, would have concluded that the second or reference cantilever differs from the first cantilever only in lacking the binding partner and is otherwise the same as the first cantilever.

The Office Action on page 2 paragraph ¶2 alleges that "Quate et al. teach using a cantilever palette comprising an interdigital array of cantilever where the cantilever palette includes a plurality of cantilever fingers surrounded by a frame with frame fingers...", citing Quate et al., column 6, line 18-55. Applicants respectfully assert that Quate does not describe the second cantilever as a "frame with frame fingers" in describing any embodiment of the grating having the reference cantilever.

The standard for rejection under 35 U.S.C. §102 is identity. Present independent claims 1, 14, 30 and 36 are directed to a frame having frame fingers that are stationary, and because Quate uses a reference cantilever that is capable of deflection but does not deflect only because it does not have a binding partner. Therefore, Quate is not the same as the present claims, and does not anticipate the present claims.

Further, the Office Action on page 3, paragraph 1, admits that “Quate et al. use laser or photodiode to illuminate the cantilever to detect the diffraction light in response to the binding event.” One of ordinary skill in the art would have recognized that Quate’s laser or photodiode requires a source of electrical power to detect cantilever bending, as well as an electric circuit to connect the photodiode or laser to the source of power.

In contrast, the specification as filed states, on page 7, lines 30-33, “[o]bserve that the cantilever palette 20 does not require external power, since the actuation is chemical and mechanical (chemical-mechanical) and the detection is based on dispersion of background white light.”

Quate uses electrical power for laser/photodiode illumination for detection of cantilever bending. The present specification expressly states that the device does not require external power, using instead background white light. An advantage of the present device is independence of external electrical power, clearly asserted in the specification as filed, which as intrinsic evidence has evidentiary priority over extrinsic evidence such as a dictionary.

The present claims are distinguished from Quate for at least two reasons: Quate lacks the mechanical arrangement of frame fingers and cantilevers; and Quate uses external power.

In view of the forgoing, the Applicants respectfully request reconsideration and withdrawal of the present rejection of the claims under 35 U.S.C. §102 (e).

Claims 4, 24, 28 and 36 are Non-obvious in view of the Cited References

U.S. patent number 6,289,717 by Thundat et al., a secondary reference cited by the Office Action as rendering claims obvious in combination with primary reference Quate et al., refers to cantilever fingers that are capable of bending. There is simply no teaching or suggestion in Thundat of a frame with frame fingers. Thundat fails even to mention a diffraction grating. Therefore this reference fails to cure the defects of Quate et al. as characterized above.

Present pending claims 4, 24, 28 depend directly or indirectly from claim 1 and take all of the limitations of claim 1. Claims 1 and 36 require a frame with frame fingers, as described above. Therefore these claims require structural features that are neither taught nor shown by either of the cited references, alone or in combination. As claims 1 and 36 are not obvious in view of the combination of Thundat and Quate, so claims 4, 24, 28 are not obvious.

Thundat further fails to suggest using background white light as a source of illumination for detection of cantilever bending.

The devices and methods of the present claims were intended to be portable, i.e., free of any power source, and inexpensive, as shown by the quotation from page 7 of the specification as filed, and were envisioned to be used with background white light as a power source. The motivation for making the present device and methods was to invent an inexpensive cantilever sensor for potential use in the field, i.e., in the absence of peripheral highly technological components. Thus the devices of the present claims, having cantilever palettes with cantilever fingers that are capable of deflecting, and a frame with frame fingers that are stationery, prepares the device by a one step solution chemistry procedure to coat it with a sensing material that covers the entire device, including the frame and frame fingers.

This ease and freedom from high technology peripheral components is not true of the devices of the cited references.

Quate's claim 18 requires that a first cantilever have analyte and a second cantilever not have analyte. Quate fails to teach or show the user how to prepare such a device, i.e., enabling methods for two closely spaced cantilevers having different surfaces is not provided.

Thus Quate's method of claims 18 requires preparing a test cantilever or first cantilever, typically very small (of 100 μm in length, 50 μm in width and only 1 μm in thickness; Ibid. column 4, lines 66-67), by attaching a first biological analyte molecule on a surface as in claim 1,

and having a second cantilever to which analyte molecules are not attached. Further, Quate requires lasers or photodiodes for illumination, not background white light.

Quate's methods and devices are not consistent with the express motivation for the present claims of having devices and methods with "low instrumentation cost". See specification as originally filed, page 3 line 20.

Therefore based on motivation, the present claims are not obvious in view of the combination of Quate and Thundat.

In view of the forgoing, the Applicants respectfully request reconsideration and withdrawal of the present rejection of the claims under 35 U.S.C. §103 (a).

Conclusion:

For the reasons presented above, all claims are believed to be in condition for allowance.
A Notice of Allowance is therefore respectfully requested.

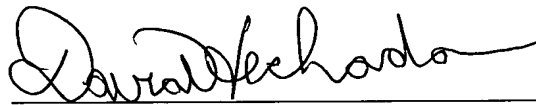
Should the Examiner feel that a telephone conference would advance prosecution of the present application, he is invited to call the undersigned attorney at the number listed below.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

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By:



David R. Heckadon

Registration No. 50,184

P.O. Box 1404
Alexandria, Virginia 22313-1404
(650) 622-2300